



South Carolina Department of Health and Environmental Control

Rediscovering HABs in SC

Emily Bores

SC TASK GROUP ON HARMFUL ALGAE

- Organized in 1997 as a response to a *Pfiesteria* outbreak in Maryland
- Multi-institutional collaboration to monitor and study HABs
- Last published newsletter: Spring 2005

SC TASK GROUP ON HARMFUL ALGAE- Part 2??

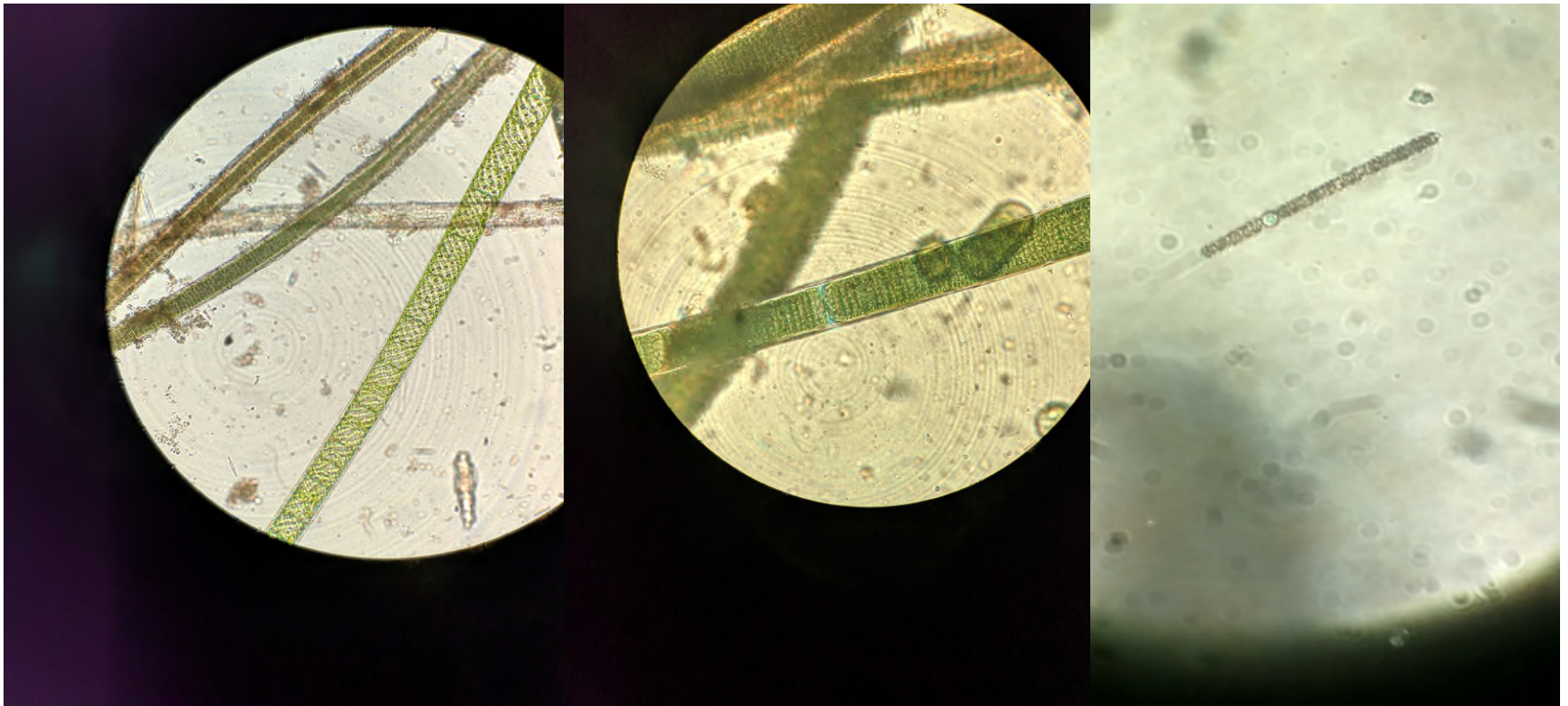
- Lyngbya blooms on Wateree
- SC HABs workgroup
- NOAA, DNR, USGS, SC Sea Grant Consortium
- Freshwater AND Saltwater



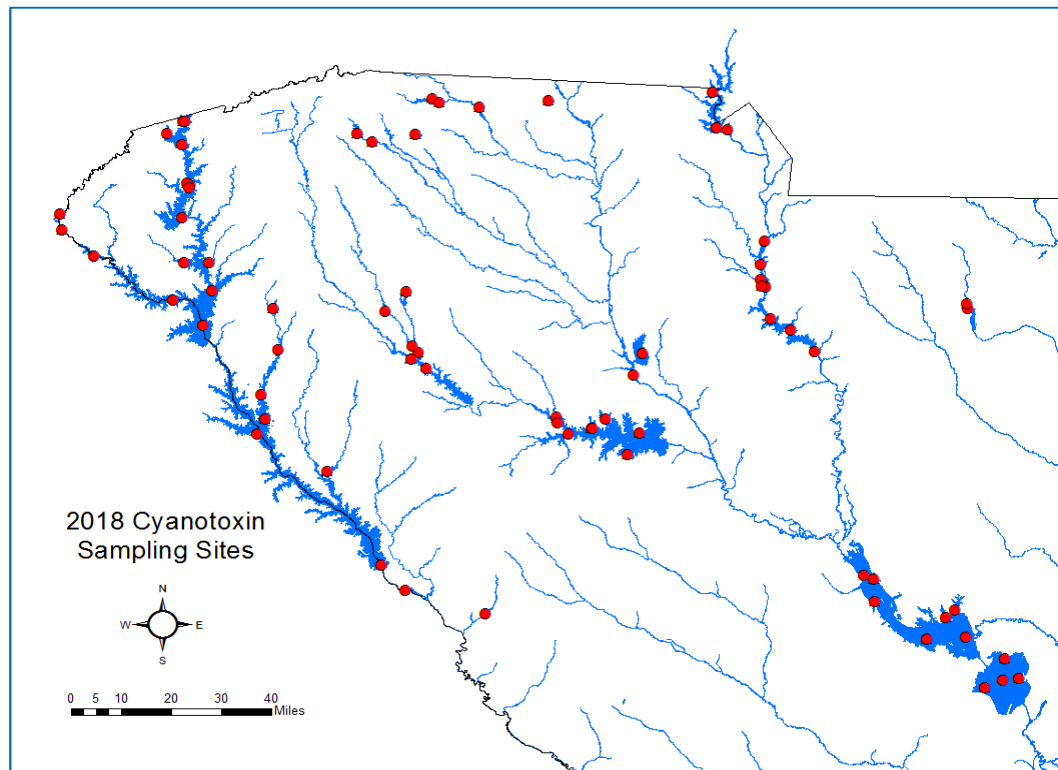
Phytoplankton ID's

- Trained by NOAA to ID freshwater toxic algae
- ID for potential toxic cyanobacteria:
 - Aphanizomenon- Saxitoxin
 - Dolichospermum- Anatoxin-a
 - Cylindrospermopsis- Cylindrospermopsin
 - Microcystis- Microcystin
 - Planktothrix- Anatoxin, Microcystin
- Receive confirmation from NOAA
- Toxin Analysis

Algal ID's



Summer 2018 Background Study



Methodology: Enzyme Linked Immunosorbent Assay (ELISA)

- Why ELISA??
 - One of the most common techniques for screening
 - Relatively Inexpensive
- What toxins??
 - Why Microcystins and Cylindrospermopsin?
 - EPA Guidelines

EPA Drinking Water Health Advisory (10 day)

Cyanotoxin	Bottle-fed infants and pre-school children	School-age children and adults
Microcystins	0.3 µg/L	1.6 µg/L
Cylindrospermopsin	0.7 µg/L	3 µg/L

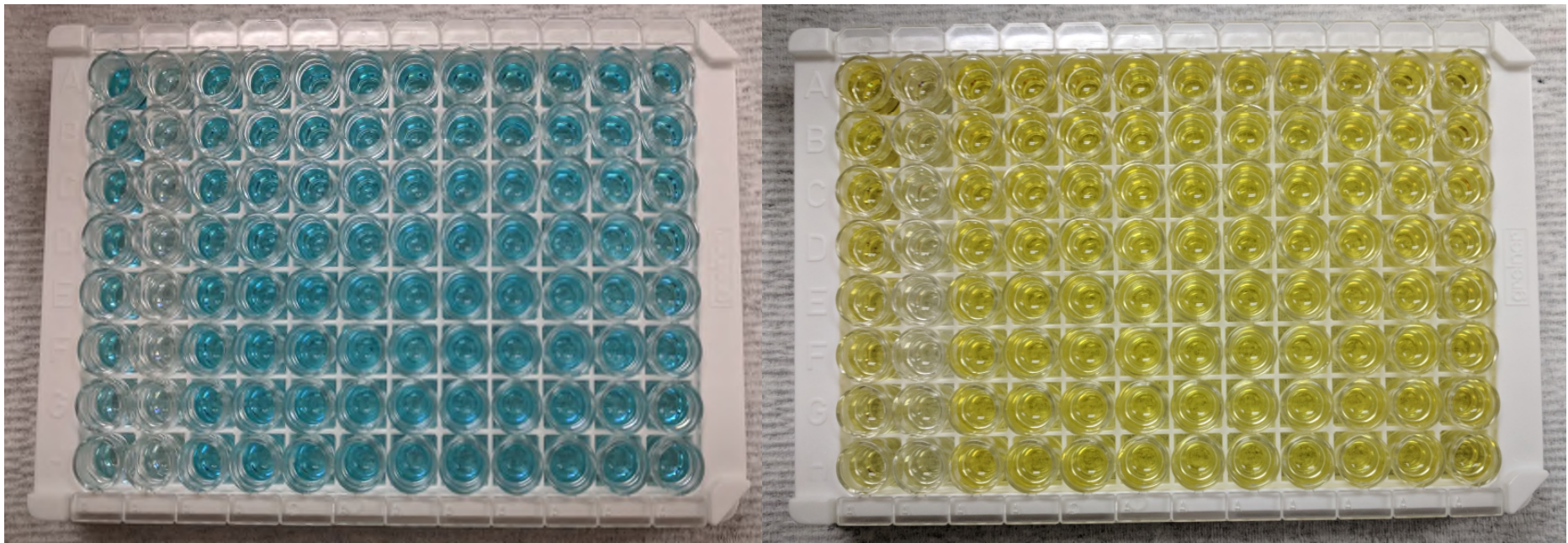
EPA Recreational And Swimming Criteria

Microcystins Magnitude (ug/L)	Cylindrospermopsin Magnitude (ug/L)	Duration	Frequency
8	15	1 in 10 day assessment period across a recreational season	More than 3 excursions in a recreational season, not to be exceeded in more than one year

Methodology: ELISA

- 96-well microtiter plate- coated
- Standards, control, samples, LRB
 - Cell lysing (freeze and thaw)
 - Filter samples
- Antibody solution, enzyme conjugate solution, color solution, stop solution
- Read absorbance at 450nm in plate reader

Microtiter Plate (12x8 strips)



Cylindrospermopsin Results

- Out of the three months of sampling, only one routine station had a quantifiable amount of cylindrospermopsin
- A fish kill had presence of cylindrospermopsin- 0.060 ug/L



Broadway Lake

RL-18136 -	0.131	0.158	0.126
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Lake Murray

S-310 -	0.154		0.111	0.12
S-309 -	0.148		0.143	0.102
S-222 -	0.087		0.097	0.126
S-213 -	0.153	0.117	0.132	0.16
S-211 -	0.108	0.123	0.107	0.159
RL-18099 -	0.14	0.123	0.041	0.139
RL-18096 -	0.143	0.126	0.109	0.158
RL-18079 -	0.349	0.212	0.101	0.136

Lake Rabon

RL-18138 -	0.151	0.137	0.103
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Lake Russell

SV-357 -	0.144	0.066	0.132	0.137
SV-098 -	0.077	0.095	0.164	0.231
RL-18092 -	0.167	0.163	0.144	0.121

Lake Bowen

RL-18089 -	0.192	0.133	0.164	0.038
B-339 -	0.351	0.159	0.115	0.127

Lake Cooley

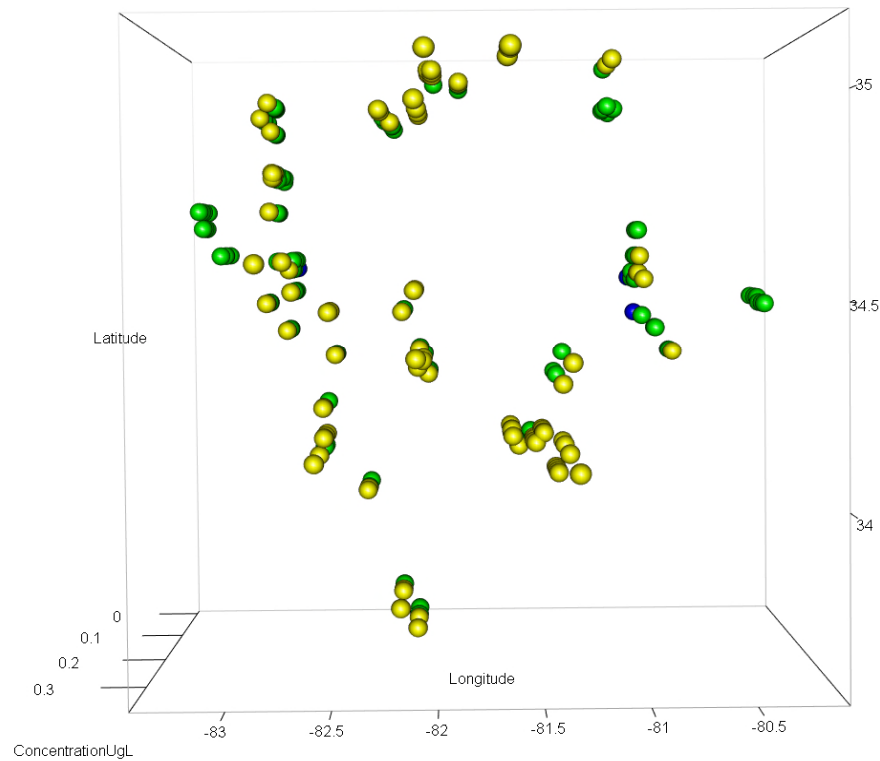
RL-18139 -	0.301	0.194	0.1	0.137
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Lake Whelchel

RL-06435 -	0.358	0.371	0.287
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Strom Thurmon Reservoir

RL-18100 -	0.101	0.117	0.046	0.092
CL-041 -	0.111	0.194	0.074	0.101
	Aug	Sep	Oct	Nov

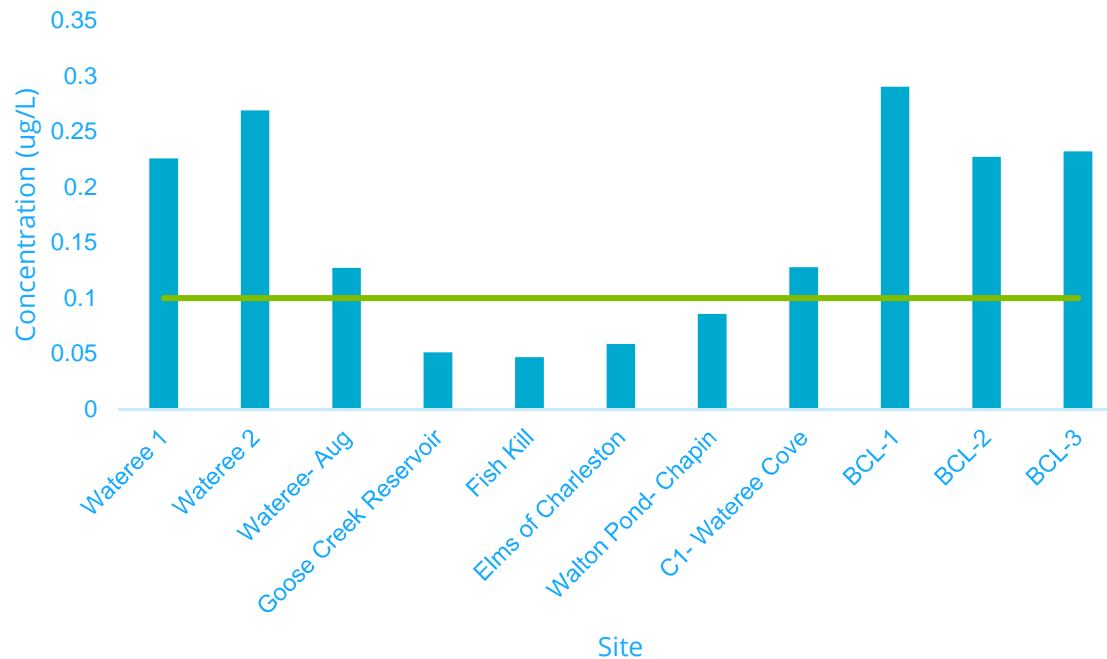




Conclusions

- Examined Nutrients, Chlorophyll, Ammonia, and Turbidity at the lakes
 - All below water quality parameters
 - No direct correlation
- Quantifiable results, but still low in terms of recreational criteria
- Potential for future toxic blooms

Random Algal Bloom: Microcystins Results



What's next???

- Relatively mild summer in terms of blooms
- Continue study in 2019: base and random lake sites and potential handpicked sites
 - Expand to Drinking Water intake locations
- Focus: Microcystins
- Phytoplankton nets
- Adopt EPA draft recreational standards once they become official

CONTACT US

QUESTIONS??

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